

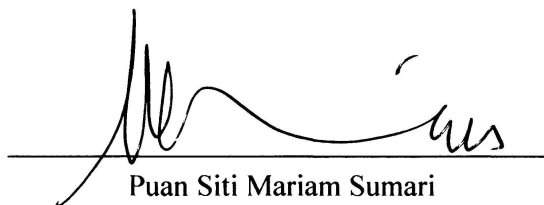
**THE STUDY OF ADSORPTION ISOTHERM AND SELECTED  
OPERATING VARIABLES ON ADSORPTION OF REACTIVE AND  
DIRECT DYES ONTO MgALNO<sub>3</sub>-LDH**

**NOR ASMA YAHYA**

**Final Year Project Report Submitted in  
Partial Fulfilment of the Requirements for the  
Degree of Bachelor of Science (Hons.) Applied Chemistry  
in the Faculty of Applied Sciences  
Universiti Teknologi MARA**

**MEI 2009**

This Final Year Project Report entitled “**The Study of Adsorption Isotherm and Selected Operating Variables on Adsorption of Reactive and Direct Dyes onto MgAlNO<sub>3</sub>-LDHs**” was submitted by Nor Asma Yahya, in partial fulfillment of the requirements for the Degree of Bachelor of Science (Hons.) Applied Chemistry, in the faculty of Applied Sciences, and was approved by



Puan Siti Mariam Sumari  
Supervisor  
B.Sc. (Hons.) Applied Chemistry  
Faculty of Applied Sciences  
Universiti Teknologi MARA  
40450 Shah Alam  
Selangor



Miss Sabjina Yahya  
Project Coordinator  
B.Sc. (Hons.) Applied Chemistry  
Faculty of Applied Sciences  
Universiti Teknologi MARA  
40450 Shah Alam  
Selangor



Dr Yusairie Mohd  
Head of Programme  
B. Sc. (Hons.) Applied Chemistry  
Faculty of Applied Sciences  
Universiti Teknologi MARA  
40450 Shah Alam  
Selangor

Date: 26 MAY 2009

## **ACKNOWLEDGEMENT**

In the name of Allah, The Most Beneficent, The Most Merciful, I would like to express my thanks to Allah S.W.T. for giving me strength and patience to complete this project.

I would like to express my sincere thanks to my supervisor Puan Siti Mariam Sumari for giving me the opportunity to work with her to complete this thesis, for her guidance, ideas, and support throughout the period of this subject.

A lot of thanks to my family for their support .Again I would like to thank to all personnel either direct or indirectly for helping me to complete this project.

Thank you.

## TABLES OF CONTENTS

	Page
<b>ACKNOWLEDGEMENT</b>	ii
<b>TABLES OF CONTENTS</b>	iv
<b>LIST OF TABLE</b>	vi
<b>LIST OF FIGURE</b>	vii
<b>LIST OF ABBREVIATIONS</b>	ix
<b>ABSTRACT</b>	x
<b>ABSTRAK</b>	xi
 <b>CHAPTER 1 INTRODUCTION</b>	
1.1 Background	1
1.2 Significance of study	4
1.3 Objectives of study	4
 <b>CHAPTER 2 LITERATURE REVIEW</b>	
2.1 Layered Double Hydroxide (LDH)	5
2.2 Application of LDH	7
2.3 Introduction to Dye	8
2.4 Classification of Dyes	9
2.5 Type of Dyes Used and Chemical Structures	10
2.6 Adsorption Process	11
2.7 Equilibrium Modelling	12
 <b>CHAPTER 3 MATERIALS AND METHODS</b>	
3.1 Chemicals	15
3.2 Equipment and instruments	15
3.3 Synthesis of Layered Double Hydroxide (MgAl-NO <sub>3</sub> )	16
3.4 Characterization of the LDH	17
3.4.1. Powder X-ray Diffractometer (XRD)	17
3.4.2. Scanning Electron Microscope (SEM)	17
3.5 Batch Adsorption Studies/Optimization studies	18
3.5.1. Color Measurement	18
3.5.2. Effect of contact time	18
3.5.3. Effect of different initial concentration	19
3.5.4. Effect of adsorbent dosage	19
3.5.5. Effect of particle size	19

## ABSTRACT

### THE STUDY OF ADSORPTION ISOTHERM AND SELECTED OPERATING VARIABLES ON ADSORPTION OF REACTIVE AND DIRECT DYES ONTO $\text{MgAlNO}_3\text{-LDH}$

The potential of Magnesium Aluminium Nitrate layered double hydroxide ( $\text{MgAlNO}_3\text{-LDH}$ ) as adsorbent for removal dye from aqueous solution was investigated. In this study, Mg/Al was synthesized by using co precipitation method. Two reactive dyes which are Reactive Red 120 (RR 120) and Reactive Orange 16 (RO 16) and one Direct Red 80 (DR 80) dye were used in this study. The effect of contact time, different initial concentration, particle sizes and dosage were observed. The results, adsorption for all dyes showed that the data was better fitted to the Langmuir isotherm rather than Freundlich isotherm. In term of maximum adsorption capacity, the value are 87.7193 mg/g, 85.4701 mg/g and 140.845 mg/g for Reactive Red 120, reactive Orange 16 and Direct Red 80 dyes respectively. The favourability of adsorption is indicated by the value of  $R_L$ . All the  $R_L$  values were between 0 and 1 for all dyes.